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(54) RECORDING DEVICE AND ITS METHOD

(57)Abstract:

PURPOSE: To provide a print having high picture quality from image data recorded on a video tape.

CONSTITUTION: According to the standard of digital video tape recorders(DVTR), image data are recorded on the video tape. The image data expressing a picture desired to be printed are found out and transformed to the data structure of an interface at the interface of the DVTR. The image data transformed to the data structure of the interface are transformed to the data structure of a floppy disk FD at a format transforming circuit 42 of the recorder. The image data transformed to the data structure of the floppy disk FD are recorded onto the floppy disk FD by a magnetic head 46. The floppy disk FD, on which the image data are recorded, is carried into a laboratory system and the print having high picture quality can be provided.

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CLAIMS

[Claim(s)]

[Claim 1] The data about the image data to which the digital image data showing two or more images express the image which it is recorded on the digital video tape and should be printed from this digital video tape set to a digital videotape recorder. In order to be chosen and to obtain a print image from the data about this selected digital image data The data about digital image data Are equipment recorded on an intermediate record medium, and the data about the digital image data given from the digital videotape recorder are changed into a record format of the above-mentioned intermediate record medium from a record format of a digital videotape recorder. The recording device equipped with the record control means recorded on the above-mentioned intermediate record medium in the changed record format.

[Claim 2] The recording device [equipped with a playback means to reproduce the data about the image data from which the above-mentioned record format was changed] according to claim 1.

[Claim 3] The data about the image data to which the digital image data showing two or more images express the image which it is recorded on the

digital video tape and should be printed from this digital video tape set to a digital videotape recorder. In order to be chosen and to obtain a print image from the data about this selected digital image data The data about digital image data Are the approach of recording on an intermediate record medium, and the data about the digital image data given from the digital videotape recorder are changed into a record format of the above-mentioned intermediate record medium from a record format of a digital videotape recorder. The record approach recorded on the above-mentioned intermediate record medium in the changed record format.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] In the digital video tape with which the digital image data with which this invention expresses two or more images are recorded In the processing laboratory (the photograph store in which development and printing service are possible is included) (it is called a laboratory) from data the data about the image data showing the image which should be printed are chosen, and concerning this selected image data In order to obtain a print image, it is related with the equipment and the approach of recording the data about digital image data on intermediate record media (a magnetic disk, magneto-optic disk, etc.).

[0002]

[Background of the Invention] When it is going to obtain a print from a video tape in an analog videotape recorder, the video signal with which it reproduces, a desired image is discovered and a desired image is expressed is given to the printer. However, the resolution of the print which did in this way and was obtained from the printer is low, and a high-definition print is not obtained. In order to obtain a high-definition print, it is necessary to use a business-use high resolving printer. However, in order to obtain a print from a high resolving printer, equipment, a computer apparatus, etc. which change the video signal outputted from an analog videotape recorder were required, and it was difficult to obtain a high-definition print easily individually.

[0003]

[Description of the Invention] This invention aims at obtaining a high-definition print from the digital image data recorded on the digital video tape comparatively simply.

[0004] The recording device by this invention two or more images The data about the image data to which the digital image data which express express the image which it is recorded on the digital video tape and should be printed from this digital video tape set to a digital videotape recorder. In order to be chosen and to obtain a print image from the data about this selected digital image data The data about digital image data Are equipment recorded on an intermediate record medium, and the data about the digital image data given from the digital videotape recorder are changed into a record format of the above-mentioned intermediate record medium from a record format of a digital videotape recorder. It is characterized by having the record control means recorded on the above-mentioned intermediate record medium in the changed record format.

[0005] This invention also offers the record approach. Namely, the data about the image data to which the digital image data showing two or more images express the image which it is recorded on the digital video tape and should be printed from this digital video tape set to a digital videotape recorder. In order to be chosen and to obtain a print image from the data about this selected digital image data The data about digital image data Are the approach of recording on an intermediate record medium, and the data about the digital image data given from the digital videotape recorder are changed into a record format of the above-mentioned intermediate record medium from a record format of a digital videotape recorder. It is characterized by what is recorded on the above-mentioned intermediate record medium in the changed record format.

[0006] The above-mentioned record processing is usually performed in a user. The above-mentioned record processing may be performed most in a laboratory.

[0007] In the above-mentioned record processing, the data (data, such as image data, a photography day, and exposure time) about image data are changed into a format of intermediate record media (a magnetic disk, magneto-optic disk, etc.) from a record format of a digital videotape recorder, and are recorded on an intermediate record medium.

[0008] A user brings an intermediate record medium to a laboratory, and print processing is performed in a laboratory. Even if the user does not have a high-definition printer by this, a high-definition print is obtained.

[0009] Usually, a regenerative function may be given to the recording device which a user possesses. The check of the image printed by this also becomes easy.

[0010]

[Example] Drawing 1 is the block diagram and drawing 2 (A) which show the electric configuration of a digital videotape recorder. The format Fig. of a digital video tape, and drawing 2 (B) It is the block diagram showing the electric configuration of the recording apparatus which a track-format Fig. and drawing 3 change the output data of a digital videotape recorder into the format Fig. of the output data of a digital interface, changes drawing 4 into a format of a floppy disk, and is recorded on a floppy disk.

[0011] When reading the image data recorded on the digital video tape and printing as it is, it will become the low print of resolution. In order to obtain the print of high resolution, it is necessary to use a business-use high resolution printer. In this example, in order to obtain the print of high resolution, image data is obtained from the digital videotape recorder shown in drawing 1 , and in the recording apparatus shown in drawing 4 , it changes into a format of a floppy disk from a format of a digital video tape, and the image data which expresses with a floppy disk the image which wants to obtain a print is recorded. Thus, the print of high resolution can be obtained by carrying into a laboratory the image data recorded on the floppy disk using the business-use printer for high resolving installed in a laboratory. There is a system which obtains the print of high resolution from a floppy disk in a laboratory from the former, and a high-definition print is obtained using this system.

[0012] In advance of the configuration of a digital videotape recorder, and explanation of operation, the existing standard industry specification about the recording method to the magnetic tape by the digital videotape recorder is explained.

[0013] A record format of a magnetic tape is drawing 2 (A). And (B) It is shown. Drawing 2 (A) The truck Tr of a magnetic tape 8 is shown and many trucks Tr are formed in the direction of slant at a fixed include angle to the longitudinal direction of a magnetic tape 8. The digital image data for one frame are recorded using ten trucks which continue among the trucks Tr of these large number.

[0014] Drawing 2 (B) Track format is shown. In one truck Tr, a sub-code record section, the video record section, the auxiliary record section, the audio record section, and the truck information record section are included. Information, such as a time code for high-speed search and an

absolute track number, is recorded on a sub-code record section. The digital image data showing a photographic subject image are recorded on a video record section. The data showing a sound are recorded on an audio record section. The information used as the criteria of Truck Tr for the magnetic head to trace the core of Truck Tr is recorded on a truck information record section. An auxiliary record section is prepared at intervals and additional information is recorded on this auxiliary record section. As for the gap prepared between each field, illustration is omitted.

[0015] CCD used for the image pick-up section of a digital videotape recorder is the horizontal direction 720 which is generally the level (former) CCD transfer clock frequency of 13.5MHz. A pixel and perpendicular direction 480 A thing with the number of pixels of about 350,000 pixels of a pixel is used. The digital image data for one frame obtained using such CCD are recorded on ten trucks of a magnetic tape 8. This is the existing specification.

[0016] With reference to drawing 1, the configuration and actuation of a digital videotape recorder are explained. Since the digital videotape recorder shown in drawing 1 is already well-known, explanation is simplified.

[0017] It sets to a recording mode and is by CCD11. A photographic subject is continuously photoed with the period of $1 / 30$ seconds. The analog video signal outputted from CCD11 is a horizontal direction 720 about serial image data while the data rearrangement circuit 12 is given and an analog video signal is changed into digital image data. The image data and perpendicular direction 480 for a pixel Rearrangement processing of image data is performed so that it may become the array of the image data for a pixel.

[0018] In the data compression circuit 13, data compressions, such as DCT (Discrete Cosine Transform) processing, are made, and image data is given to the error correction sign addition circuit 14. In the error correction sign addition circuit 14, the sign for an error correction is added to image data. In a modulation circuit 15, it becomes irregular, and image data is amplified in the record amplifying circuit 16. The amplified image data is given to the magnetic head 17, and the image data for one frame is recorded over ten trucks of a magnetic tape 8.

[0019] The digital videotape recorder also has the regenerative function. The image data recorded on the magnetic tape 8 by the magnetic head 21 in the playback mode is read, and it is amplified in the playback amplifying circuit 22. It gets over in a demodulator circuit and the amplified image data is given to the error correction circuit 24. In the

error correction circuit 24, the error correction processing based on an error correction sign is made, and the data growth long-gyrus-of-insula way 25 is given.

[0020] On the data growth long-gyrus-of-insula way 25, the compressed image data is elongated and the data rearrangement circuit 26 is given. In the data rearrangement circuit 26, it is made the data array suitable for the display of image data, and a display 27 is given. The image expressed by the image data recorded on the magnetic tape 8 by this will be displayed on a display 27.

[0021] Both the entry of data from an external device and the output of the data to an external device are possible for the digital videotape recorder shown in drawing 1 , therefore the digital interface 28 is established.

[0022] The data given from an external device are given to the error correction sign addition circuit 14 through the digital interface 28. Thereby, it is given to the magnetic head 17 through a modulation circuit 15 and the record amplifying circuit 16, and is recorded on a magnetic tape 8. Moreover, the data read from the magnetic tape 8 are outputted to an external device through the digital interface 28 from the error correction circuit 24.

[0023] Drawing 3 shows the DS (data format) of a digital interface (DIF).

[0024] In the digital interface 28, conversion to the DS of the digital interface shown in drawing 3 from the DS according to a record format of the digital videotape recorder shown in drawing 2 is performed.

[0025] Drawing 4 is the block diagram showing the electric configuration of a recording apparatus. The recording apparatus shown in drawing 4 records the data outputted from the digital videotape recorder shown in drawing 1 on a floppy disk FD.

[0026] Drawing 7 shows the file structure (DS) of a floppy disk FD from drawing 5 .

[0027] With reference to drawing 5 , there are the index file for managing a directory and all the data recorded on the floppy disk FD, the image file which recorded image data, a file which records resource AUX information, a script file, an image cast file, and an additional image file in a floppy disk FD. The pass to an album name (file name) and an index file is stored in the directory.

[0028] Drawing 6 shows the detail of an index file.

[0029] A header, an image entry, contraction image data, and representation image data are included in an index file.

[0030] Image information, such as pass to ID of an index file, a version, and a representation image, a creation date of this file, a modification

date of this file, the number of images (the number of registered images) stored in this file (if required), and a photography day, etc. is contained in the header.

[0031] What expresses most directly two or more images contained in one file is called representation image. A representation image is used suitable to take out the target image out of many images.

[0032] An image entry is created for every image and the data about an image are stored. Image information, such as the ID number of an image file, an album name (file name), an ID number of an image, pass to image data, an attribute, a parameter, and AUX, etc. is contained in the image entry.

[0033] Drawing 7 shows the detail of an image file.

[0034] There are a header, an image information field, an image piece information field, a pass field, and an image data area in an image file.

[0035] The table which memorized a version number, a compression method, image rotation information (predetermined include-angle rotation of the image can be carried out if needed, and it is the rotation information at that time), the class of image, resolution, etc., the creation date of this file, etc. are stored in the image information field.

[0036] Drawing 8 shows the procedure of the recording device shown in drawing 4 .

[0037] When recording the image data currently recorded on the digital video tape on a floppy disk FD with reference to drawing 4 and drawing 8 , a playback mode is set up, animation playback is performed and a digital videotape recorder is displayed on a display 27. If a desired image is displayed on an indicating equipment 27, still playback mode will be chosen in a digital videotape recorder. The image chosen when still playback mode was chosen is displayed on a display 27 as a still picture.

[0038] If a desired image is found, a digital videotape recorder (DVTR) and a recording apparatus will be connected through the digital interfaces 28 and 41. It continues, and if a floppy disk FD is inserted in the recording apparatus with which a floppy disk FD is inserted in a recording apparatus (step 51), the number data of registered images stored in the index file of a floppy disk FD will be read by the magnetic head 46. The read number data of registered images are given to a control unit 30. Thereby, the recorded number of sheets of a floppy disk FD and the recordable number of ** sheets are displayed on an indicating equipment 47. It will be exchanged by the floppy disk FD with many ** sheets if there are few ** sheets than the number of sheets which it is going to record.

[0039] The definite carbon button 32 depressed when recording the input device 31 which inputs into a recording device the comments (the title of an image, explanation, etc.) displayed with an image, and desired image data on a floppy disk FD, the recording-mode setup key 33, the elimination mode setting carbon button 34, the termination setup key 35, and the piece NO. setup key 36 are contained. The signal showing the push down of the comment input data given from these input devices 31 and carbon buttons 32-36 is given to a control unit 30.

[0040] A push on the recording-mode setup key 33 makes a recording apparatus a standby condition (step 54). (step 53) At this time, from the digital videotape recorder, the image data showing a desired static image is given, and it has inputted into the recording device through the digital interface 41. Image information other than image data (photography day etc.) is also inputted into a recording device from a digital videotape recorder. Image information is recorded on the predetermined part in video record section A3 of a magnetic tape 8.

[0041] If there is push down of the definite carbon button 32 when the image data showing a desired static image has inputted into the recording apparatus, the image data given will be given to memory 40 through the digital interface 41 and the format conversion section 42, and will once be memorized (step 55). The image data once memorized by memory 40 is read from memory 40, and is given to the format conversion circuit 42. The format conversion circuit 42 is a circuit which changes into the DS of a floppy disk FD the DS in the digital interface 28 shown in drawing 3 . Since the data given from a digital videotape recorder are the DS in the digital interface 28 shown in drawing 3 , they are changed into the DS of the floppy disk FD shown in drawing 7 from drawing 5 in the format conversion circuit 42. Moreover, if required, a comment will be inputted from the comment input device 31, and the data showing a comment are also given to the format conversion circuit 42. In the format conversion circuit 42, data are created so that the data showing a comment may be stored in the resource AUX information file shown in drawing 5 .

[0042] The data outputted from the format conversion circuit 42 are given to the thinning-out circuit 43 and a modulation circuit 44, respectively. Record of the contraction image data which expresses a contraction image in addition to record of the image data which usually expresses an image with the recording apparatus shown in drawing 4 is also possible. The circuit which creates contraction image data is the thinning-out circuit 43. In the thinning-out circuit 43, infanticide processing of image data is performed so that a contraction image may be

expressed. The contraction image data outputted from the thinning-out circuit 43 is also given to a modulation circuit 44.

[0043] In a modulation circuit 44, the modulation of the data to input is performed, and the record amplifying circuit 45 is given and it is amplified. The data amplified in the record amplifying circuit 45 are recorded on a floppy disk FD by the magnetic head 46 (step 56). Thereby, contraction image data is recorded on an index file, image data is recorded on an image file, and comment input data is recorded on a resource AUX information file. According to the file structure which, of course, also shows data other than these data (image information etc.) to drawing 5 - drawing 7 , it is recorded on a floppy disk FD.

[0044] It is judged whether record is continued or not (step 57). When it is judged that processing of steps 54-57 is repeated and record continuation is not carried out when judged as record continuation, it returns to step 52. Decision of being record continuation is possible by the existence of the push down of the definite carbon button 32 in after [record termination] fixed time amount of image data.

[0045] If the elimination mode setting carbon button 34 is pushed (step 53), it will shift to washout mode. Piece NO. NO. showing the piece which should be eliminated with the assignment carbon button 36 It is specified (step 58). Piece NO. If specified, an elimination signal will be given to the magnetic head 46 and the image data about a piece and contraction image data which were specified will be eliminated from a floppy disk FD (step 59). If processing of step 58 to the step 60 is repeated (it is YES at step 60) and elimination processing is not continued when elimination processing is continued, it returns to processing of step 52 (being step 60 NO).

[0046] All processings end (step 53) and a recording device by pushing the termination mode setting carbon button 35.

[0047] The image data which expresses a desired static image among the image data recorded on the video tape 8 as mentioned above will be recorded on a floppy disk FD. A user can get a high-definition print by carrying into a laboratory the floppy disk FD with which the image data showing a desired static image was recorded.

[0048] Drawing 9 shows the laboratory system installed in a laboratory.

[0049] The printing equipment 82 which a laboratory bakes the developer 81 which develops the film (a negative or positive) kept for the customer (user) non-developed negatives, and the image which appeared in the developed film on printing paper (or increase of a glow), and is carried out is formed. There is also a thing of the type with which a developer 81 and printing equipment 82 were unified. Anyway, these

developers 81 and printing equipment 82 are well-known. These equipments 81 and 82 are electrically connected with the computer system 70 of a laboratory system if needed. These equipments 81 and 82 may be included in a laboratory system, and it may think, or may not be made to contain, or whichever is sufficient.

[0050] As for the laboratory system, an input device 71, the film reader 73, the image data processor 74, the photograph printer 75, a disk driver 72, playback, and the display-control circuit 76 are connected to this computer system 70 by the bus, the cable, or the serial communication line including computer system 70. Displays (for example, a CRT display, a liquid crystal display, etc.) are connected to playback and the display-control circuit 76.

[0051] An input device 71 is used in order to input various data, a command, etc. which are given to the various equipments 72-76 connected to computer system 70 or this including a keyboard or a mouse. Moreover, in order to perform selection in the menu displayed on the display screen of a display 77, assignment of an image, etc., an input device 71 is operated by the operators (worker in a processing laboratory etc.) of a laboratory system.

[0052] Computer system 70 generalizes actuation of the whole laboratory system while controlling equipments 72-76 according to an individual. The peripheral device of memory (semiconductor memory, a floppy disk, hard disk, etc.) and others is contained in computer system 70.

[0053] The film reader 73 picturizes the image of each piece expressed by the developed film, and outputs the digital image data showing the picturized image. The film reader 73 consists of digital disposal circuits (the required thing of the White counterbalancing circuit, a gamma correction circuit, the negatives / positive inverter circuits, etc. is included), A/D conversion, etc. which process the video signal (or digital image data after A/D conversion) acquired from the image pick-up equipment containing solid-state electronic image sensors (the Rhine sensor may be used), such as the light source which illuminates a film, image pick-up optical system (it extracts if needed and a shutter, a zoom lens, etc. are included), and CCD, and image pick-up equipment. The digital image data outputted from the film reader 73 are once memorized by the memory in computer system 70. The identification number of an image is given to this digital image data for every piece. The resolution (a pixel number and the number of gradation) of original digital image data is defined according to extent demanded in a photoprint (for example, the number of pixels is 3072x2048 and 2048x1536 grade).

[0054] A disk driver 72 reads the data recorded on the floppy disk FD inserted in the laboratory system.

[0055] The image-data-processing circuit 74 is a circuit which obtains the image data which carries out data decompression of the image data read from the floppy disk FD by the disk driver 72, and expresses a high-definition image. For example, an image data-interpolation circuit and a data growth long-gyrus-of-insula way can realize, and the image-data-processing circuit 74 is changed into the image data of a high pixel.

[0056] The photograph printer (hard copy unit) 75 prints the image expressed by the digital image data on paper using what was specified among the digital image data recorded on the floppy disk (that an order with for an extra copy was placed). It is the photograph with which this printed thing was printed additionally.

[0057] After developing a film, the image expressed by that film may be printed on paper using this photograph printer 75, and a printing photograph may be created. In this case, printing equipment 82 can be made unnecessary. That is, the digital image data obtained by reading a film with the film reader 73 are given to the photograph (once it was stored in memory of host computer if needed) printer 75.

[0058] Playback, the display-control circuit 76, and an indicating equipment 77 are used for the display of a menu screen in case an operator operates a laboratory system etc., the display of an image, etc. If it says about the display of an image, the image expressed by the image data outputted from the film reader 73 and the image expressed by the image data read from the floppy disk FD will be displayed on the display screen of a display 77 if needed.

[0059] In such a laboratory system, if the floppy disk FD with which image data was recorded by the user is carried in, a laboratory system will be equipped with the floppy disk FD. The image data on which the floppy disk FD with which the laboratory system was equipped is recorded by the disk driver 72 is read. The image data read by the disk driver 72 is given to the memory of computer system 70, and is once memorized.

[0060] Image data is read from the memory of computer system 70, and is given to the image-data-processing circuit 74. The image data showing a high-definition image is obtained by performing data decompression processing, interpolation processing, etc. in the image-data-processing circuit 74. The image data showing the high-definition image outputted from the image-data-processing circuit 74 is given to the photograph printer 75. Thereby, a high-definition print is obtained from the photograph printer 75.

[0061] Drawing 10 and drawing 11 show other examples. The block diagram showing the electric configuration of the record regenerative apparatus which drawing 10 records the image data recorded by the digital videotape recorder on a floppy disk, and is reproduced, and drawing 11 are flow charts which show the procedure in the record regenerative apparatus shown in drawing 10. The same sign is given to the same object as what is shown in drawing 4 in drawing 10, the same sign is given to the same processing as the processing shown in drawing 8 in drawing 11, and explanation is omitted, respectively.

[0062] The record regenerative apparatus shown in drawing 10 to being equipment with which the recording apparatus shown in drawing 4 changes and records the image data given from a digital videotape recorder on a format of a floppy disk FD is equipment which can display the image which reproduces the image data which was recorded on the floppy disk in addition to changing and recording the image data given from a digital videotape recorder on a format of a floppy disk FD, and is expressed by image data.

[0063] In the record regenerative apparatus shown in drawing 10, the playback mode setting carbon button 37 is contained.

[0064] It shifts to a playback mode by pushing the playback mode setting carbon button 37 (step 53). It is piece NO. continuously. Piece NO. which should be reproduced with the assignment carbon button 36 It is specified (step 61). Piece NO. to reproduce If specified, the image data about the specified piece will be read by the magnetic head 46. The read image data is amplified in the playback amplifying circuit 91, and is given to a demodulator circuit 92. It gets over in a demodulator circuit 92, and image data passes through the format conversion circuit 93, is given to memory 40, and is once memorized.

[0065] The format conversion circuit 93 is a circuit changed into the DS of the digital interface 28 included in the DS and the digital videotape recorder suitable for a display from the DS of a floppy disk FD.

[0066] The data suitable for a display with which format conversion was carried out in the format conversion circuit 93 are given to the data growth long-gyrus-of-insula way 94, and, as for the compressed image data, data decompression is given. The output data of the data growth long-gyrus-of-insula way 94 are given to the data rearrangement circuit 95, and are made the display array of a display 96. The output data of the data rearrangement circuit 95 are given to an indicating equipment 96, and the image expressed by the image data recorded on the floppy disk FD is displayed on an indicating equipment 96 (step 62).

[0067] When recording the image data recorded on the floppy disk FD on a

video tape, the data changed into the DS of a digital interface from the DS of a floppy disk FD in the format conversion circuit 93 are given to the digital interface 41. This data is outputted through the digital interface 41, and is given to a digital videotape recorder. In a digital videotape recorder, the data given are given to the magnetic head 17 through the error correction sign addition circuit 14, a modulation circuit 15, and the storage amplifying circuit 16 through the digital interface 28, and are recorded on a video tape 8.

[0068] Also in the record regenerative apparatus shown in drawing 10, record of data in a format of a floppy disk FD is possible, and a high-definition print can be obtained by carrying into a laboratory system the floppy disk FD with which image data was recorded.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block diagram showing the electric structure of a digital videotape recorder.

[Drawing 2] (A) A format of a ** video tape is shown and it is (B). Track format is shown.

[Drawing 3] The DS of a digital interface is shown.

[Drawing 4] The electric configuration of a recording device is shown.

[Drawing 5] The DS of a floppy disk is shown.

[Drawing 6] The DS of an index file is shown.

[Drawing 7] The DS of an image file is shown.

[Drawing 8] Record of a recording device and elimination procedure are shown.

[Drawing 9] It is the block diagram showing the electric configuration of a laboratory system.

[Drawing 10] It is the block diagram showing the electric configuration of a record regenerative apparatus.

[Drawing 11] The record in a record regenerative apparatus, elimination, and a regeneration procedure are shown.

[Description of Notations]

8 Magnetic Tape

28 41 Digital interface

30 Control Unit

42 93 Format conversion circuit